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Observations on Aujeszky's Disease in Northern Ireland

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BELFAST

(*Continued from page* 625.)

PART III

Possible Methods of Infection in Natural Outbreaks

Aujeszky's disease is such a striking condition, caused by an easily transmitted infective agent, that one would imagine that there should be no difficulty in tracing the source of infection. Actually the method of transmission under natural conditions and the source of the virus is not definitely known.

It has long been suspected that rats played some role in the transmission of the disease. Balas (1908) found rats infected with Aujeszky's disease and it was a very natural assumption that cats and dogs were infected by catching diseased rats. Hutyra (1910) demonstrated the virus in the brains of sick rats found on farms where Aujeszky's disease was present amongst cattle. Shope (1935*a*) also favours the view that rats spread the infection. He postulates the following cycle:—

1. Infected rats are eaten by pigs which as a result become infected.
2. Infected pigs eliminate virus in their nasal secretions, a fact which Shope (1935*a*) proved by abrading the skin in rabbits and rubbing the snout of the pig against the abraded area. A fatal attack of Aujeszky's disease resulted.
3. Infected pigs infected cattle in this manner.
4. Other rats became infected by feeding on the carcases of the dead cattle.

The author has examined the nasal secretion of two affected pigs for presence of virus with negative results.

Burggraaf & Lourens (1932) point out that in the outbreak investigated by them symptoms were first seen amongst the pigs and they held the view that the disease was transmitted from the pigs to the cattle. Patto (1932) noted that in all the outbreaks which he encountered there was close contact between the pigs and cattle. Burggraaf & Lourens (1932) placed cattle in close proximity to infected pigs without infecting the cattle. They were also unable to transmit the disease to cattle by placing them in byres formerly occupied by infected cattle and pigs.

The disease does spread comparatively easily from infected pigs to healthy ones (Koves & Hirt (1934), Shope (1935*a*)). Shope (1935*a*) considers that pigs are the natural reservoirs of the virus. In addition to Shope a number of workers have commented on the insidious nature of the disease as it occurs amongst pigs, *e.g.*, Von Ratz (1914), Koves & Hirt (1934), Burggraaf & Lourens (1932), Steiner & Lopez (1935). All these workers comment on the low mortality rate and the rather indefinite symptoms which occur amongst pigs. Hirt (1935) states that when sucking pigs become affected 95 per cent. may succumb. In the outbreak investigated by Lamont & Shanks (1939) two litters involving 24 sucking pigs were affected and the mortality rate was 100 per cent. Older pigs in contact were not affected and the author has since investigated a case in a young pig which was intended for an influenza experiment. The herd of swine from which it originated contained ten sows and 24 store pigs. Antibody formation was found in the blood serum of four of the sows and in 14 out of the 24 store pigs. No symptoms of illness had been noticed in any of these pigs at any time. It is interesting to note that two out of five blood samples drawn from pigs on this farm twelve months later were also found to contain neutralizing antibodies.

Shope (1935) after examining for neutralizing antibodies, pooled and individual samples of swine serum collected from pigs in the Middle West region of the U.S.A., came to the conclusion that Aujeszky's disease was a highly prevalent but unrecognized disease of pigs at that period in that region. Pig sera collected in the State of New Jersey showed no antibody formation. In the outbreak amongst cattle investigated by Shope (1935*a*) blood samples were collected from six swine and the six surviving cattle one month later and tested for antibody formation. None of the cattle sera neutralized the virus but four out of the six swine sera did. The same worker also records that he tested 23 samples of commercial swine fever antisera and found neutralizing antibodies in 21 of them. The author has made some investigations along these lines in Northern Ireland.

In connection with the first outbreak investigated (Lamont & Kerr (1939)) the owner supplied a rather interesting piece of information—"that the rats had disappeared from his farm that spring and that he had noticed several sleepy rats about shortly before the occurrence of the disease and that he and his staff had had no difficulty in killing them with their feet." Traps were set by the author but no rats were caught and although repeated visits were made no evidence of rats being seen could be obtained.

In the second case investigated (Lamont & Shanks (1939)) the owner stated that rats were present but were not numerous. A cat on this farm developed the disease and not only was there clear evidence of the cat having a tussle with a rat but at *post-mortem* examination unhealed injuries were present on the lower jaw. The cat showed intense pruritus of this region. Two rats were trapped on this farm but attempts to demonstrate the virus in the central nervous system failed.

In the third case the owner mentioned that in the spring and early summer he had noticed a considerable number of dull, sleepy rats and that he had killed quite a number by stamping on them. He had noticed no rats for some time. He set traps with a view to securing rats for experimental purposes, without results. Very considerable numbers of rabbits were noticed on this farm and a careful search on several occasions failed to show any symptoms of illness or the carcases of any rabbits about the warrens (in epidemics due to other diseases, *e.g.*, coccidiosis and liver fluke, the author has found the carcases of rabbits lying in the runs).

In the case of canine infection recorded by Cassells & Lamont (1942) there was clear evidence that the two affected animals killed a rat. No other animal on this farm showed any evidence of infection and the blood sera of 20 of the larger pigs and all the cattle were tested for evidence of neutralizing antibodies with negative results. In this case the evidence seems to indicate that infection came from the rat. Traps have been set on this farm but only one rat has been sent for examination, with negative results.

EXPERIMENTS WITH RATS (*Mus decumanus*)

Three brown rats were infected by subcutaneous inoculation of five guinea-pig M.L.D.s. Symptoms appeared on the third day and consisted of intense pruritus at the site of inoculation. Death occurred in a few hours. The presence of virus was demonstrated in the brain by inoculation of rabbits.

Two rats were fed portion of a rabbit carcase (dead from typical Aujeszky's disease). On the second day the rats were dull and sleepy. Both rats became comatose and death occurred on the third day. Virus was recovered from their brains by inoculation of rabbits subcutaneously, using 2 c.c. of a 10 per cent. brain suspension in Hartley's digest broth. A portion of the brain of one of these rabbits was placed between two biscuits and fed to a third wild rat. Two days after eating this "sandwich" the rat became dull and sleepy. It died on the third day and virus was demonstrated in its brain by rabbit inoculation.

The possibilities of the common wild cat (*Mus decumanus*) acting as a reservoir of virus were considered. Forty-two rats were trapped. Two of these rats came from a farm where cases had occurred amongst pigs and six of them from a farm where a case in a pig had occurred and where antibody formation was found in the blood sera of a number of pigs. One rat was obtained from the farm where the cases in dogs occurred. Some of the remainder came from a knackery where the rats had opportunities of feeding on the carcases of animals collected over a wide area of Northern Ireland.

The brains from these rats were handled in lots of three. The brains were removed and emulsified in Hartley's digest broth to give a 20 per cent. suspension. A rabbit was inoculated with the suspension (dose 2 c.c.) from each batch of rats. No evidence of Aujeszky's disease developed in the inoculated rabbits.

TESTS FOR ANTIBODY FORMATION IN BLOOD SERA

Blood samples were collected from 15 wild rats (*Mus decumanus*). Source of rats: ten of the rats were trapped at a knackery, two

came from one "Aujeszky farm" and three from another "Aujeszky farm." No evidence of antibody formation was found in any of the sera.

Although the findings in the rat experiments are disappointing they do not rule out rats as a source of infection. In the first place, Aujeszky's disease is not a common disease in this country so that the possibility of finding an infected rat in the relatively small number examined is rather remote.

The author's experiments indicate clearly that rats can be easily infected by ingestion. The history of rats showing symptoms, on two of the farms where outbreaks occurred, resembling those seen in the rats infected by the oral route is suggestive. The case in the cat is also interesting and the history of the tussle with the rat is at least suggestive of the rat as the source of infection—equally, of course, the cat may have infected itself through bringing its injured jaw in contact with material infected by the nasal secretion of the affected piglets.

The history of the cases in the two sheep dogs is also very suggestive of rat infection and indeed in this case there does not seem to be any other possible source when one considers that no symptoms appeared amongst other animals on this farm and that no evidence of neutralizing antibodies against the virus of Aujeszky's disease could be found in the blood sera collected from the pigs and cattle on this farm.

Examination of Pig Sera for Neutralizing Antibodies Against the Virus of Aujeszky's Disease

In view of the fact that the blood sera of some pigs showed evidence of neutralizing antibodies to the virus and in view, also, of Shope's (1935*b*) findings, a number of blood sera from swine collected from various areas in Northern Ireland was examined.

Methods Used

A strain of virus isolated in Northern Ireland (Lamont & Kerr (1939)) was used for the tests. The virus was passaged through three rabbits subcutaneously, using infective brain material. Six rabbits were then inoculated intracerebrally. These rabbits became comatose on the second day and death resulted in an average time of 48 hours following inoculation. The brains were dissected out, sliced into small pieces, and stored in 50 per cent. glycerine. The minimum lethal dose for guinea-pigs was determined by inoculation with serial dilutions in Hartley's digest broth. This was found to be 1 c.c. of a 0·5 per cent. suspension, or 5 mg. A potent antiserum was available for checking purposes. Owing to a shortage in guinea-pig supplies sera were not tested individually but in pooled lots of five samples. This method was used by Shope (1935*b*) who found that the neutralization test is quite effective even though the virus-neutralizing serum has been diluted 1:20 with serum containing no antibody. The author fortunately had in his possession some naturally immune sera and before resorting to the pooling method a number of tests were made to check the method. It was found regularly that 0·2 c.c. of the naturally immune serum plus 0·8 c.c. of a known negative serum would neutralize effectively 50 minimum lethal doses of virus for the guinea-pig. In one test 100 minimum lethal doses were used and were effectively neutralized.

The blood samples to be tested were collected from pigs sent in to bacon-curing factories for slaughter. The samples were collected by veterinary officers, one from each pig, in one-ounce bottles. The veterinary officer noted the district from which the pig came. (In Northern Ireland pig farmers bring their fat pigs to purchasing centres. They are purchased at these centres and an identification tag attached so that the Veterinary Officer is able to indicate the particular area from which the pig originated.) On arrival at the laboratory the sera had usually separated. The serum was pipetted off into a labelled tube. Generally the sera were grouped in lots of five and for the purpose of the test 0·2 c.c. (or more depending on the number of samples) was pipetted off from each sample and added to an agglutination tube, the object being to have 1 c.c. of mixed serum in each tube.

The virus suspension was prepared from the pooled brains as previously described and the suspension contained not less than 20 guinea-pig M.L.D.s in each c.c. One c.c. of this suspension was then added to each c.c. of mixed sera, thoroughly mixed and the mixture left standing for from two to two and a half hours. At the end of this period 1 c.c. of the serum virus suspension was inoculated into a guinea-pig. Each batch was controlled with the known positive and a known negative serum. Where a particular guinea-pig survived, the test was repeated either again collectively—or if guinea-pigs were available individual tests were applied to each sera comprising the suspected positive group. It was necessary to do this as occasionally a guinea-pig is encountered with a considerable degree of natural resistance. The inoculation in the guinea-pigs was made invariably into the right hind limb and care was exercised to avoid leakage of the inoculum.

Discussion of Results of Serum Neutralization Tests (Porcine)

The total number of samples tested was 760.

The total number of pool or bulk samples which appeared to show antibody formation was 21.

On further retesting it was found that 27 individual samples, *i.e.*, 3·5 per cent., showed definite virus neutralizing properties. In addition some 18 bulk samples were found to protect the guinea-pigs for as long as five days, and in one case for six days, whereas the average period in which death ensued was three days. Unfortunately shortage in guinea-pig supplies prevented the author from following these tests further.

In connection with the samples in which definite antibody formation was demonstrated it may be pointed out that 20 of these positive samples came from one farm and that two came from another farm, so that in the random survey made only five positive samples were found. This result would not indicate a widespread infection amongst pigs in Northern Ireland as found by Shope (1935*b*) in the Middle West States. In addition, at the first farm where three cases occurred amongst young bovines, blood samples were collected from 36 pigs and no evidence of virus-neutralizing antibody formation was detected. At the Aughnacloy farm 35 samples from pigs were tested and evidence of virus-neutralizing bodies was found in two samples only. Both of these samples came from sows which had access to pasture and one of them was in the field where the affected cow grazed. Enquiry showed that the other sow also had access to this field. No neutralizing bodies were found in the sera of the housed pigs. These housed pigs were from 14 to 16 weeks old and had no contact with the affected cow and none with the sows for from six to eight weeks. On the first farm the pigs may be ruled out as a source of infection. On the Aughnacloy farm the sows may have been infected from the same source as the cow. The fact that none of the other pigs was infected points rather to some factor in the field as a source of infection and not to a factor about the farm buildings. The case at this farm occurred on July 24th, 1940. The blood samples from the pigs were collected on October 21st, 1940, so that there was ample time for infection to spread amongst the pigs should it have been introduced.

At the farm where a single case in a pig occurred four sows out of twelve and 14 store pigs out of 23 were found to have virus-neutralizing bodies in their sera. Nine or ten cows were grazing continuously with these sows and no symptoms of illness appeared in the cattle. Rats were often seen at this farm and six were trapped and examined with negative results. It is noteworthy that at no time was any symptom of illness noticed amongst the pigs with the exception of the pig which died and from which the virus was recovered. It may be noted that Glover (1938) examined 250 blood samples from pigs in England with completely negative results.

In the author's experiments with pigs, infection did not spread from the inoculated pigs to the incontact pigs. The fact, too, that pigs develop a potent antiserum on infection hardly suggests this animal as a reservoir of virus. In Northern Ireland pigs as a rule are not in intimate contact with cattle.

The possibility of ticks and lice harbouring the virus occurred to the author and it was possible to make two experiments on these lines. A number of ticks (*Ixodes ricinus*) were collected from the cow at Aughnacloy. These were pulverized in a mortar, suspended in Hartley's digest broth and inoculated subcutaneously into a rabbit with negative results. A number of lice (*Haematopinus suis*) were collected from a pigling which died from the disease. These were treated similarly and injected subcutaneously into a rabbit with negative results.

Injections of virus into experimental animals indicate clearly that the symptoms of pruritus are associated with the entry site of the virus. In affected bovines the great majority of animals show pruritus of the vulvar and anal region. Bovines are notoriously itchy about this area and take pleasure in rubbing against posts, etc., or in being scratched. In this rubbing process minute abrasions of the skin may be caused. The suggestion is put forward that the bovine infects this site by rubbing it against some object contaminated with the virus.

Two cases have been seen by the writer involving the face: it is not uncommon to see bovines butting at each other and possibly they may inflict injuries sufficient to permit the entry of the virus.

In one case the pruritus area involved one side of the thorax. Animals in health lick this region regularly.

The author was able to infect a calf by rubbing virus into an area of skin below the anus from which the hair had been removed by shaving. The shaved area was reddened and some pin-point blood spots were present.

The possibility of infection being conveyed by bites is unlikely. It is very unusual for rats to attack a normal healthy bovine. In Aujeszky's disease there is no tendency to bite.

Most of the cases seen by the author occurred in December, January and March. This does not suggest an insect vector.

The possibility of an infected rat contaminating a rubbing post or similar object cannot be overlooked, but this raises the question of the source of virus for the rat. The possibility of virus being introduced in imported maize has also been considered. Three samples of maize meal were heavily contaminated with rabbit brain emulsion rich in virus and a fourth sample was contaminated with infected rabbit blood. The samples were stored in the dark at room temperatures for periods of five, eight and ten weeks. The samples were extracted with Hartley's digest broth and the extracts tested on rabbits both by subcutaneous inoculation and also by scarification. The results were negative.

Galloway (1938), Remlinger & Bailly (1935) and Shope (1931) comment on the resistance of the virus to desiccation. The writer has also confirmed this, but when the long interval between cases and the moist nature of the Northern Ireland climate is considered, desiccation hardly supplies the answer.

Summary

The occurrence of Aujeszky's disease in Northern Ireland has been confirmed in cattle, pigs, cats and dogs. Descriptions of symptoms obtained by the author indicate that cases of infection have also occurred in sheep. Experimentally it has been transmitted to cattle, pigs, rabbits, guinea-pigs, rats and probably horses. Equines are not easily infected and it is necessary to keep them under observation for four weeks before deciding that a negative result has been obtained. Experimental infection of poultry was not successful. Virus neutralizing sera have been prepared from pigs and horses. Experiments are described which show clearly that in the rabbit the virus is free in the blood plasma and serum and not specially attached to the red cells as has been claimed by Remlinger & Bailly (1938).

The experiments and symptoms described suggest that natural infection occurs through minute abrasions of the skin and that thereafter infection travels by the neural route. The evidence in favour of this view is:—

1. The pruritus at the site of infection.
2. The pruritus occurring at the terminal distribution of the sciatic nerve in two experiments after this nerve had been sectioned.
3. The failure to find virus in the brain after intravenous inoculation of virus, although the virus was circulating in the blood for ten hours.
4. The pruritus which occurred in the "mane" region of two cattle after inoculation of the breast region, showing that the pruritus was due to inflammation of the corresponding cervical spinal ganglion as has been proved histologically by Hurst (1933).
5. The failure to find virus in the blood stream of infected cattle.
6. The finding of virus in the spinal cord but not in the brain of two cattle killed showing symptoms.
7. The finding of virus in the lumbar region of the cord but not in the cervical region in one of these animals.
8. Similar findings to 6 and 7 in two rabbits killed at the onset of symptoms.

The suggestion is put forward that cattle infect themselves by rubbing against posts, etc., contaminated with virus. The source of this virus is not known and the examination of over 700 individual blood samples collected from swine in all parts of Northern Ireland does not suggest the pig as a reservoir of virus as has been suggested by Shope (1935*b*) in U.S.A. Presumptive evidence points to the rat as a source of virus for dogs and cats. The author's experiments show that rats are comparatively easily infected with the virus but as this infection terminates fatally the rat is not suggested as a source of virus but rather as a transmitting agent or victim.

The negative experiments with meal infection do not point to imported maize as a source of virus. Evidence is adduced which shows that the virus is very resistant to desiccation. This, however, hardly explains the method of perpetuation of the virus in a district during the long intervals which occur between outbreaks.

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Equine Anaesthesia

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Epsom

After an absence abroad of nearly nine years, it was with great interest that I listened to the paper read by Mr. T. N. Gold, and the replies of Mr. H. C. Swann, followed by the comments of various members present at the N.V.M.A. Congress at the Royal Veterinary College on Tuesday, September 24th, 1946. My feelings were mainly those of disappointment; but this in no way detracts from the merit of Mr. Gold's contribution to the subject on which he had been asked to deliver a paper by the N.V.M.A.

The bulk of the discussion took place around the relative advantages of chloral hydrate and chloroform as a general anaesthetic for equines.

Time did not allow as many members as would have wished to express their views on this subject, but after hearing the opinions of Professors Wright and Mitchell, it is with a certain amount of trepidation, but a very full knowledge of both forms of anaesthesia, that I would now like to supplement their statements by my own observations.

At the end of 1943, due to the initiative of Colonel C. Stuart, D.D.V.S. Central Command, India, it was decided that a serious attempt be made to ensure that all mules and ponies taking part in long range penetration operations in Burma should be, if possible, noiseless. With this object in view the animals employed were operated on for the enucleation of the vocal chords, and in many cases the ventricles of the larynx.

To accomplish this it was obvious that an anaesthetic would have to be administered, and as a member of the team carrying out this work in the latter part of 1943, and as officer in charge of muting operations in 1944, I had ample opportunity for observing the relative merits of both forms of anaesthetic.

In 1943 I took part in and observed the anaesthetization of some 1,500 animals by chloral hydrate intravenously, but I would say that from my observations not more than 5 per cent. were truly anaesthetized. The remainder were reduced to varying states of narcosis. The estimated dose could not be varied very greatly due to the large number of animals operated on daily, and the lack of any means other than those of measurement and subsequently computation by which to judge their weight, but generally speaking, after withholding food on the previous night the dosage approximated to 5·5 grammes per cwt. in a 10 to 12 per cent. solution. In many cases this must have been 6 grammes per cwt.

Subsequently, as Surgical Specialist to the 14th Army, the majority of my operations were carried out under chloral narcosis, and in some cases anaesthesia, so that roughly estimating, I have administered chloral intravenously to something approaching 2,000 animals. As I have had the opportunity of observing its effects on so many animals compared with the number mentioned by Professor

Wright in describing his investigations, I am prompted to give my opinion; more especially so as Mr. Swann suggested that the experiences of the R.A.V.C. during the last war might provide some interesting data for the profession.

Space does not permit me to give details of the varying strengths employed, nor of rapidity of administration. The general impression gained, however, is that neither had any significant bearing on the animal's immediate reaction to the drug.

The predominating impression, which both professors failed to mention, but was touched on lightly by Mr. Gold in his concluding remarks, was the tremendous amount of idiosyncrasy to be observed in animals of the same breed, shape, and approximate weight. For some considerable time my colleagues and I thought that the manufacturers might not have been sufficiently careful in standardizing the preparation of this drug. Subsequently, however, this same idiosyncrasy was observed when the administration of the drug took place with preparations all obtained from the same consignment of chloral hydrate of undoubted purity. We recorded something like a dozen cases in which animals recovering from narcosis after being operated upon, lay recumbent for periods varying from 15 to 40 minutes, then struggled to their feet, walked off the operating bed for a distance of 10 to 15 paces, and dropped down dead. Respirations would continue spasmodically for a minute to a minute and a half, whereas the pulse and heartbeat were undetectable in approximately 30 seconds. The administration of all known stimulants failed to revive any cases of this nature. We found the safest measure to adopt was to leave the animal recumbent for as long as possible after the operation, and to be in no hurry, once they had willingly regained their feet, to move them away. Latterly intravenous cocaine was of some help.

It will be realized that there was a wealth of material upon which to perfect the technique of administration. Yet even with a technique of the high standard which, to my knowledge, was achieved by many officers of the R.A.V.C. serving in India and Burma, the bogy of necrosis due to extravascular injection or leakage, was never completely eliminated. As Professor Wright was so emphatic in recommending chloral hydrate as *the* equine anaesthetic to be adopted by the profession, I feel bound to give my opinion that one cannot confidently recommend this drug to be used exclusively in private practice for inducing either narcosis or anaesthesia in large animals.

It is felt that a high degree of courage is called for if, for instance, one were asked to operate on a colt with classic pretentions whose value to-day would not be less than £10,000, using chloral intravenously as an anaesthetic. Conforming to precedent, should the standing position be employed, a small amount of the drug, as the result of a sudden movement, might infiltrate into the tissue surrounding the jugular vein, with a subsequent necrosis and slough. In this connection it might be of interest to mention that when satisfied that mal-administration was purely subcutaneous, we cut down on the jugular, exposing an area of some four inches round its length, and washed out the surrounding tissues vigorously with normal saline solution. This was recommended by Colonel Stuart, and was undoubtedly the correct procedure.

In 1944 approximately 2,400 animals were anaesthetized for the same operation by means of chloroform inhalation. Out of this total exactly two succumbed to the effects of the anaesthetic. The initial dose, depending on weight, was four drams to one ounce, and in the case of the two deaths recorded it was found that the animals had been watered and fed the previous night, and had had access to water and green fodder the morning of the operation.

On these figures chloroform would appear to be the more satisfactory of the two drugs, but one is not confident in making such a statement, inasmuch as it will be appreciated that such was the rapidity with which operators were able to perform as a result of long practice on large numbers of animals that a very light stage of anaesthesia varying to medium narcosis was all that was necessary.

In agreement with Professor Wright and Mr. Gold, I cannot regard chloroform as a completely satisfactory anaesthetic for equines but would not describe the toxic margin, in Mr. Gold's words, as "knife edge." At the same time, as the result of conclusions I have attempted to set out, I cannot regard chloral hydrate administered intravenously as the solution to satisfactory narcosis or anaesthesia in the horse, without risk.

Whilst agreeing with the gist of Professor Mitchell's remarks, I am in total disagreement with his view that chloral administered by the stomach pump followed by chloroform inhalation is a satisfactory means of inducing anaesthesia. Space does not permit detailing the innumerable cases in which this was tried out, but suffice it to say that, again due to idiosyncrasy, my general impression is that one is flirting with the toxic properties of both drugs, and anaesthesia, when achieved, has been known to be alarming, and in some cases fatal.

The conclusions I have drawn are that for general purposes *no* satisfactory anaesthetic has been introduced up to date into equine veterinary practice. As a result of a small amount of private investigation carried out at considerable cost, I am inclined to think that the barbiturates, particularly pentothal sodium, provide the answer, but we must wait until the price is such that the induction of anaesthesia in the horse is not a luxury out of all proportion to the legitimate charge for the work performed.

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Addendum

Technique for the Administration of Chloral Hydrate Intravenously.

Either an intravenous trocar and cannula, or needle may be employed. The advantage of the former is that once firmly held in the jugular vein there is no danger of transfixation as a result of the animal's struggles, which can occur when an ordinary intravenous needle is used.

The best procedure is for an assistant to raise the jugular while the anaesthetist picks up a fold of the overlying skin, and first inserts the needle for a small distance through this. He should then insert the needle into the jugular in a parallel and downward direction for the whole of its length. When venous blood is observed to flow freely the chloral may be administered at once by means of a glass funnel, rubber tube, and adaptor. If extreme caution is advisable, normal saline (one ounce) may be first poured in, in order to check on the rate of flow: should the needle meantime, by any chance, have slipped out of the lumen of the vein, this will be very slow.

Chloral hydrate solution should always be administered by gravity for this reason, and *not* pumped into the vein, as the rate of flow itself is an indication whether the needle has, or has not, remained in the vein. It is a wise measure to see that the last two ounces of fluid entering the vein are normal saline, as withdrawal of the needle then becomes innocuous, and no chloral can escape into the surrounding tissue during the process. Rare cases were encountered in mules when, instead of the chloral flowing into the vein, the glass funnel became infused with venous blood from the jugular vein, into which chloral could not penetrate by gravity. I observed no jugular pulse in these rare cases.

NEW INSTRUMENTS AND APPLIANCES

[The Editorial Committee is desirous of making this Section of *The Veterinary Record* a regular feature and would welcome contributions accordingly.]

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An Apparatus for Inhalation Anaesthesia

E. O. LONGLEY, B.SC., M.R.C.V.S.

Department of Surgery, Royal Veterinary College

The barbiturates have achieved due ascendancy in small-animal anaesthesia, but there are occasions when inhalation anaesthesia may be more convenient, as for spaying young cats, and other instances where the barbiturates are contra-indicated and inhalation anaesthesia remains obligatory, as for Caesarean section, and more rarely, splenectomy.

For these occasions in the dog, induction with chloroform and maintenance with ether (after premedication with morphia) is satisfactory, but with the usual equipment and a single container it is troublesome and may entail leaving the animal after the induction phase while the change over to ether is effected. A simple apparatus to obviate this and to meet several other contingencies of inhalation anaesthesia has been designed by the writer, a description of which follows.

The contingencies which the apparatus covers are:—

(1) Anaesthetization by ether alone, chloroform alone, or ether and chloroform vapours together.

(2) Induction by chloroform and maintenance by ether, separately.

(3) Light maintenance by ether with the provision of a separate and free oxygen supply.

(4) The free supply of oxygen, alone or

(5) With the addition of carbon dioxide.

Apparatus

This comprises three bottles (4 oz., wide-mouth) fitted with appropriately bored rubber bungs and connected by tubing, including two three-way taps, as shown photographically and diagrammatically in Figs. 1 to 6. For stability, and compactness, the bottles are

E. O. Longley: An Apparatus for Inhalation Anaesthesia

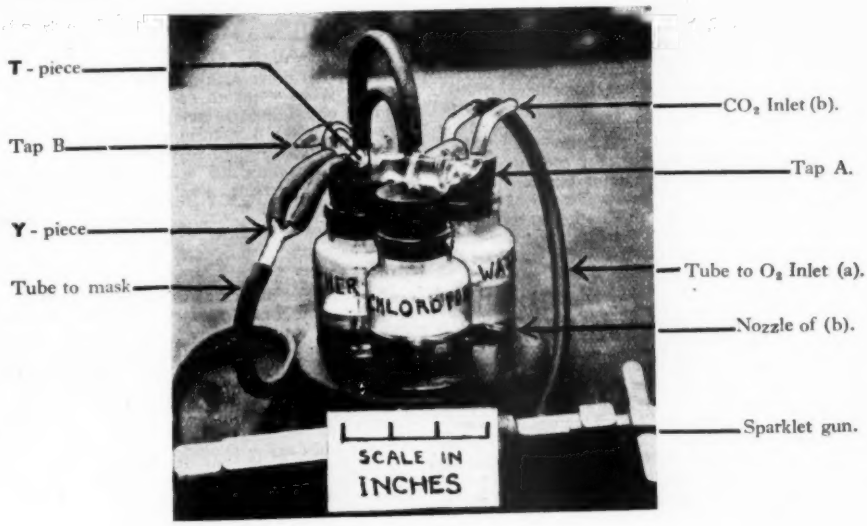

FIG. 1.

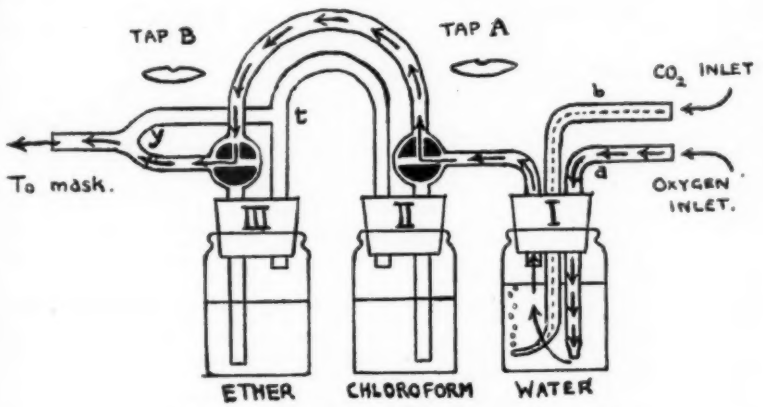

FIG. 2. Straight through path for oxygen ± CO_2.

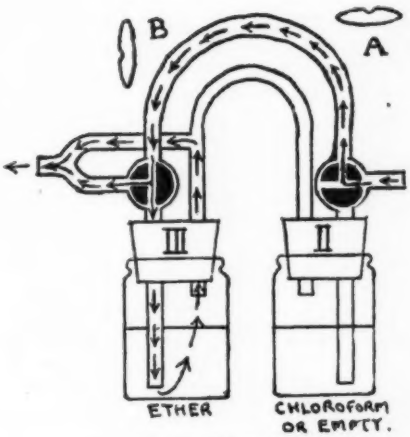

FIG. 3. Ether plus free O_2.

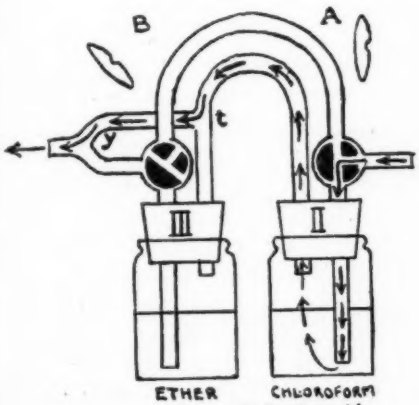

FIG. 4. Induction with chloroform.

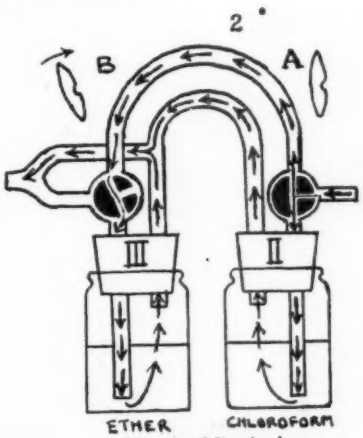

FIG. 5. Mixed ether and chloroform.

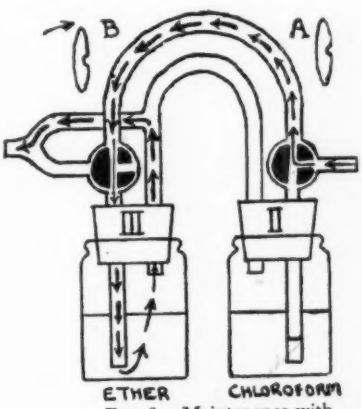

FIG. 6. Maintenance with ether.

set in triangular formation in a wooden base (5½ in. diameter) suitably excavated to receive them. For convenience, and to obviate error, the bottles (I, II and III) may be labelled "Water," "Chloroform," and "Ether," respectively.

The bungs of bottles I and II are rigidly connected by the glass tube of tap A, while bung III is loosely connected to the rest by rubber tubing. This will be found to facilitate the removal of all bungs for filling, while the bung of bottle III may easily be detached separately, where ether only is to used, or the ether requires replenishing during the course of operations.

Ground-out spots on the handles of the taps, as provided by the manufacturers, permit immediate orientation of their pathways, as is indicated by the notched elliptical figure over each tap in the diagrams. Inspection of these will reveal that for tap A there are only two settings (1) *vertical, spot to the right* (Figs. 4, 5 and 6) and (2) *horizontal, spot up* (Figs. 2 and 3). This latter setting, of either tap, bypasses its respective bottle. The settings for tap B are four and will be described in conjunction with the various contingencies.

Technique of Use

Bottle I receives water, either hot for preference, or cold, and has two ports of entry, *a* and *b*. This bottle is connected to a cylinder of oxygen,* via port *a*. There are advantages in oxygen as compared with air, and every advantage in a reliable, continuous, and easily controlled source of pressure. Where carbon dioxide is available, its source is connected to port *b*. A most convenient source of CO_2 is the small Sparklet gun shown *in situ* in Fig. 1. If carbon dioxide is not available or required this port may be ignored since its nozzle, lying below the water level, constitutes an automatic valve (unless the pressure of gas delivery is excessive, when it will operate as a safety-valve). This first bottle serves to provide (1) a sight feed and mixer for the gases and (2) a humidifier.†

From bottle I the gas passes to the first three-way tap A, the setting of which determines its subsequent course. It is proposed to describe first the procedure for contingency 2, for which purpose the apparatus was primarily conceived.

Induction by chloroform; change over to and maintenance by ether.

Chloroform is placed in bottle II to the mark, and an equal measure of ether in bottle III. The taps are then set as in Fig. 4 (A: *handle vertical, spot to the right;* B: *handle at 45°, spot up and to the right*). The oxygen control valve is then opened. Inspection of the diagram will indicate that with this setting tap B is closed, and the gas can pass only through the chloroform in bottle II; from there via the T-piece (t) and the Y-piece (y) to the mask.

When induction is complete, tap B has simply to be turned through 45° to the same setting as tap A (handle vertical, spot to the right) to effect an immediate change to ether alone (see Fig. 6). The explanation for this is that though the gas reaching tap A now appears to have two paths open to it, through both bottles II and III (Fig. 6), the chloroform in bottle II has a specific gravity (1·48) more than twice that of the ether in bottle III (0·72). As a consequence, given a free channel through tap B to the ether bottle, it takes the path through the ether only, the chloroform now acting as a valve. It is the exploitation of this differing S.G. that allows the change over to be effected so simply, by an eighth turn of the one tap.

Induction or maintenance by mixed ether and chloroform.

At settings of tap B intermediate between those just cited, the gas passes through both the chloroform and the ether (Fig. 5). The explanation here is that, with partial closure of the channel through tap B, the resistance offered to the passage of the gas through the tap plus the ether, becomes equivalent to that for its passage through the heavier chloroform. It thus takes both paths, the proportional rate of flow through each liquid being controlled by the actual setting of this tap. More chloroform than ether, or *vice versa*, may be obtained at will. It will be appreciated that this arrangement obviates the serious objection to the customary use of mixtures of liquid ether and chloroform in one bottle, that in the course of operations the more volatile ether is carried away preferentially, leaving behind an increasingly higher proportion of chloroform, which is, of course, the exact opposite of what is desirable.

The course of events with these procedures will be immediately clear from a study of Figs. 4, 5 and 6 in that order.

Ether or Chloroform alone.

It is clear that by setting tap A horizontally and tap B as in Fig. 6, bottle II is bypassed and ether may be used alone out of bottle III (*e.g.* for cats) as with any existing apparatus.

Light maintenance by ether with the provision of a separate free oxygen supply.

If minimal ether with plentiful oxygen is desired, as for example at the late stages of an operation, with tap A set as above, tap B is given one half turn (vertical, *spot to left*),* as in Fig. 3. It will be seen that the oxygen now has two paths, a direct path through one arm of the Y-piece to the mask, and an indirect path through the ether and the other arm of the Y-piece, the amount of gas to pass through the ether depending on the gas pressure and being readily controlled by the oxygen control valve. This manoeuvre allows of unusually delicate control of the concentration of anaesthetic in use.

Oxygen alone.

In the event of actual or impending respiratory failure, turning *both taps horizontal, spot up*, will immediately bypass both bottles and provide a throughway for pure oxygen direct to the mask. This simple setting may be resorted to in any difficulty with complete safety. The speed with which it may be effected in anaesthetic emergency needs no recommendation. The rate of supply of oxygen may then be increased to any desired degree by opening the oxygen control valve (Fig. 2).

Oxygen and Carbon Dioxide.

If the addition of CO_2 is also indicated, as will be the case if artificial respiration should become necessary, inlet *b* of bottle I is available, and if the Sparklet gun has been set in position originally, all that is required is to open its valve, observing the sight feed of the nozzle of *b*. This nozzle has been turned to the side, away from the main oxygen jet, for better vision (see Figs. 1 and 2). It is also drawn fine, as the addition of CO_2 should always be conservative, and an excess may be worse than none.

Conclusion

Describing any equipment in writing is not easy, and in description this apparatus may seem complicated and its use difficult. In practice it proves absurdly simple, and its essentials may be mastered by anybody in a few minutes. Moreover, if the oxygen and CO_2 cylinders are handy and with rubber tubing *in situ*, its charging and complete assembly for use requires little more than a minute.

The apparatus was constructed at the College from purchased components, at a total cost of less than £1.

Summarizing, the advantages claimed for the apparatus are:—

(1) That by simply manipulating one tap, chloroform, ether, or constant chloroform-ether mixtures are available immediately as required.

(2) That in the event of crisis, pure oxygen, or oxygen plus carbon dioxide, become available with facility in seconds.

(3) That very delicate control, and the lightest maintenance with a separate free oxygen supply, is provided for.

(4) That the apparatus may nevertheless be used as a single-bottle apparatus in lieu of the standard equipments.

(5) That it is cheap, compact, and simple to use.

(6) That it has no special components, and replacements may be made immediately from any supplier.

My thanks are due to Mr. W. J. Gooden, of the Department of Medicine, who gave me assistance in assembling the apparatus: and to Mr. W. G. McLeod, recently at the Institute of Animal Pathology, who took the photograph.

*Obtainable from the British Oxygen Company at a cost of 4s. 11d. for 44 cubic feet. The cylinder is supplied on loan without charge, and will suffice for months.

†"No matter what mask or other device is employed, oxygen must be kept properly humidified by passing it through water." Hamilton Bailey (1944). "Surgery of Modern Warfare," p. 138.

*This is the only occasion when any guide-spot should be directed left. At no time is either guide-spot directed downwards.

Weekly Wisdom

Nobody should expect to attain satisfaction from popular remedies sold under pseudo-scientific names, in the market place, for home administration by the untrained. The principles of vaccine prophylaxis or therapy should be carried out only by those who really understand them.—H. Kirk, "Index of Diagnosis."

* * * * *

How poison baits for rats can be used with safety to domestic animals is explained in Infestation Control: Rats and Mice, published by H.M. Stationery Office, price 1s. 6d. The essential feature of the method is the construction of a bait container which only rats can enter, and just how to make it is described in detail in this informative booklet.

CLINICAL COMMUNICATION

Schistosomus reflexus

W. M. SALMON, M.R.C.V.S.
REDHILL

Subject.—Second calf Friesian cow.

Symptoms.—Cow had been straining for three hours and the "water bag was present at the vulva.

Procedure.—Vaginal exploration revealed a foetus, apparently a breach presentation but with both hind legs deflected upwards to lie beside the foetal thorax on the right hand side.

Procaine (8 c.c. of 2 per cent. solution) was given as epidural anaesthesia and embryotomy decided upon.

The wire of a Thygusson embryotome was introduced around the upper femoral region of the right hind leg and this was severed and allowed to drop into the lower part of the uterus. Further exploration of the pelvic region of the foetus was then possible and marked deformity noted—to the extent that only the acetabular region corresponding to the detached limb was recognizable. A considerable amount of unidentified pelvic structure was impeding further operation so this was removed with the embryotome. During this operation a quantity of foetal intestines became detached and were removed from the vagina.

A hook was inserted in the foetal remnant and operations discontinued for half an hour to allow the anaesthesia to pass off. When the cow commenced to strain again moderate traction delivered the remnant. A 1 dr. iodoform pessary was inserted. Forty-eight hours later the cow was feeding moderately well. Her temperature was 103°. The uterus was irrigated with acriflavine and a further pessary inserted.

By the next day the cow was feeding well and appeared normal.

The calf was a typical *Schistosomus reflexus*. The head, neck, thorax and anterior limbs were small but otherwise of normal appearance. The diaphragm was present but the abdominal wall absent. The viscera were deformed and lying loose in the foetal membranes. The pelvis was a deformed bony mass and was reflected anteriorly alongside the lumbar vertebral remnants, so that both hind legs lay on the right lateral aspect of the thorax, one being rotated through 180 degrees relative to the other. The hind legs were normal in appearance, covered with skin and hair, but the joints were ankylosed. The tail protruded from the fold of skin between the left hind leg and the thorax.

The condition is said to be due to failure of the edges of the embryonal disc to meet and fuse to form the abdominal cavity (Fleming).

It may be of interest to note that prior to service this cow was one of a herd several members of which had died of starvation—and was at that time in a very low state of nutrition, although change of management had effected considerable improvement prior to parturition.

AGAINST OVERSTOCKING

Commenting on the decision of the English Guernsey Cattle Society that, for their official sale next June, all animals in milk must be milked out before 6 a.m. on the day of the sale, the Editor of *The Farmers' Weekly* observes: "I wish this decision could be widely copied. Overstocking—and you see plenty of it at every market—serves no useful purpose, especially in these days when recording is the rule rather than the exception in most decent herds. Actually, the practice is largely a matter of custom, like the colouring of sheep—and just about as useful."

ABSTRACTS

[**Copper Deficiency in Cattle and Sheep on Peat Lands.** CUNNINGHAM, I. J. (1946.) *N.Z. J. Sci. Tech.* **27**. 381-396.]

The total area of peat land in New Zealand is about 400,000 acres and about one half of this has been drained and developed for farming purposes. A survey of these areas has shown most of them to be deficient in copper. Whereas normal pastures in New Zealand contain from 8·1 to 18·1 p.p.m. Cu, the peat areas contain only 1·7 to 10·8 p.p.m.; the mean value in some parts is as low as 3·6 p.p.m. and it is in areas with the lowest Cu level that most severe disease occurs.

Cows on peat land low in Cu develop severe scouring soon after a flush of grass. The faeces become thin and watery, yellowish green to black in colour, and contain many gas bubbles. The animals lose condition, the coat is rough, and there is a macrocytic hypochromic anaemia. Spring scouring often clears up in November or December, only to recur in the following spring. "Peat scour" can be cured by transferring the affected cattle to areas of different soil formation or by dosing with copper sulphate (3·5 g. in a pint of water). Although in some cases animals scour after only a few weeks on peat land the condition does not usually become severe until they have been on the affected pasture for a year or more. Young cattle are more severely affected than adults and in some areas it is impossible to produce and rear young cattle. The young cattle are very susceptible to parasitism, especially between the ages of six and nine months and 12 to 15 months. Beef cattle brought on to peat pastures sometimes do not scour but become unthrifty, and black animals may develop a muddy brown coat.

If ewes are brought on to peat pastures fresh each year they produce and rear normal lambs but if kept on the pastures for two years or longer a proportion of the lambs show ataxia and have fragile bones. The disease in the lambs is apparently identical with enzootic ataxia in Australia and swayback in England.

Few horses or pigs are kept on peat pastures and there is little evidence of disease in these species.

The amount of copper in the liver and blood of affected cattle and sheep is low in animals of all ages, *e.g.* the liver of affected cows contained an average of 11·5 p.p.m. compared with 200 p.p.m. for normal cows.

Top-dressing the pastures with 5 lb. of bluestone per acre completely prevented the development of disease. Administration of $CuSO_4$ as a drench or lick was also effective.

The author thinks that deficiency of Cu is not the sole cause of the diseases and suggests that excess of molybdenum may be concerned in addition. A few analyses showed 2·5 to 11 p.p.m. of molybdenum in peat pastures deficient in copper where scouring occurred and only 0·5 to 3·5 p.p.m. where no cases of "peat scour" were seen. Some preliminary experiments on rats suggested that administration of molybdenum caused interference with absorption and storage of copper and the giving of 3·5 mg. of molybdenum weekly to ewes was followed by death of almost all their lambs shortly after birth. It seems possible that the losses on peat pastures may be due to a combination of deficiency of copper and excess of molybdenum.

E. G. W.

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[**The Toxicity of Copper to Bovines.** CUNNINGHAM, I. J. (1946.) *N.Z. J. Sci. Tech.*, **27**. 372-376.]

Since top-dressing the pastures or dosing with copper sulphate has been found effective in the prevention of "peat scours" (see abstract above) the author carried out experiments to ascertain the possible toxicity of this salt given as single or repeated doses. Two seven months old calves given 200 to 300 mg. of Cu as copper sulphate for 12 and 16 months respectively remained normal and gave satisfactory carcases of good flavour. Two cows drenched for nine months with 500 mg. and 1,250 mg. of Cu daily, respectively, calved normally and gave good carcases. The Cu content of the livers of the cows was 839 and 1,024 p.p.m. dry matter, respectively: the amount of Cu in the liver of the newborn calves was normal (268 and 470 p.p.m.).

Single doses of copper sulphate in amount up to 80 g. had no ill effect on yearling heifers or adult cows. A single dose of 400 g. was lethal to animals of all ages. Lethal doses caused no marked rise in blood Cu but the level was raised when repeated sublethal doses were given. The Cu content of the liver was raised only if the animal survived the dose for some days. Determination of liver Cu is thus mainly of value in chronic or subacute poisoning. In acute poisoning the symptoms are usually diagnostic—severe scouring, presence of mucus in the faeces, and deep green colour of faeces or intestinal contents due to copper chlorophyll.

E. G. W.

[**Penicillin Dosage and Blood Levels in Horses.** Doll, E. R., & Dimock, W. W. (1946.) *J. Amer. vet. med. Assoc.* **108**. 209-214.]

The authors tested the *in vitro* sensitivity of strains of equine staphylococci and streptococci, *Corynebacterium equi* and *Shigella equirulis* (*viscosum equi*, the cause of joint ill) to penicillin. The first two were normally sensitive and the last two relatively insensitive to this substance. By testing the serum after injection of penicillin into horses they found that the drug appears to be more rapidly excreted in young animals than in old. They injected various doses and tested the blood level of penicillin at varying times after injection. The dose they recommend for streptococcal infections is 500 units per lb. body weight every three hours, *i.e.* for a 1,400 lb. farm horse a dose of 700,000 units every three hours. This should be increased slightly for staphylococcal infections and very greatly increased (about four times) for joint-ill infections. (For a 150 lb. foal this would mean doses of 300,000 units.)

P. S. W.

REVIEW

[**Milk : Production and Control.** [Second Edition.] By W. C. Harvey, M.D., & H. Hill, F.R.SAN.I. Published by H. K. Lewis & Co., Ltd. Price 37s. 6d.]

The appearance of the Second Edition testifies to the demand for this book. In it the authors have endeavoured to bring the text up to date, and bearing in mind the difficulties of the times, this has been fairly satisfactorily done.

The book is intended for a wide clientele, including the producer, the distributor, the retailer, the bacteriologist, the chemist, the veterinary surgeon, the Medical Officer of Health, the sanitary inspector, and the consumer, and it is, therefore, not surprising that in the sections devoted to the work of any particular one of these, the individual concerned is likely to find the detail somewhat patchy. Sometimes, as in the first chapter, the details of the chemical composition of milk are given extensively in so far as fat composition, salts, and enzymes are concerned, whereas by contrast the details on the vitamins, particularly vitamin B, are sketchy. Similarly, when one comes to the various factors influencing the spread of disease through the consumption of milk, little attempt is made to evaluate their importance. For instance, although fly infection of milk is said to be very common, infection from persons handling milk, from water, from air in the cow-shed and in the home, would seem to be given equal prominence. These are illustrations of the common weakness of the book, namely, that far too wide a field is covered in an attempt, it would appear, to include everything without giving any guide to the reader as to which of the factors are most important.

A serious omission of detail with regard to the contamination of milk is the absence of any reference to the swabs used by milkers in preparing the cow for milking. Similarly, a list of various diseases that may affect the cow and give rise to contaminated milk is given with a short description of each, but there is no indication of the variety of some of the conditions mentioned. For instance, actinomycosis of the udder is rare, but it appears in the list before **mastitis**.

One could continue to make many references to the somewhat unbalanced treatment of the text, but this would perhaps lead one to a wrong conclusion concerning its usefulness. There is no doubt that the book has a place on the shelves of most of those interested in milk production and control, although the production aspect is less well treated than that concerned with control. It has much matter which will be serviceable to the veterinary surgeon, despite the fact that this will be found mainly in the sections devoted to that part of the industry least connected with the veterinarian's work on the farm.

VETERINARY EDUCATIONAL TRUST

Sir Joseph Barcroft will give the next Fison Lecture under the auspices of the Trust, the Finance and General Purposes Committee of which has been joined by Sir Edward Wood. Recent contributions include ten guineas from members of the Devon Branch of the N.F.U., while Sir Robert and Lady Spencer Nairn have contributed a further £20 to the Trust through its Bloodstock Industry Fund. The latter has also received ten guineas from Mr. L. Ellis Adcock, a director of the Royal Ascot Hotel, this amount being the proceeds from car park charges at a recent horse sale. Mr. J. M. Roger, owner of the Bollhayes herd of Guernsey cattle has given a bull calf to be sold by auction on behalf of the Trust.

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Blood-Stained Discharge in a Cow Following Oestrus

Q. CLXXV.—*Is there any scientific evidence to support the widely accepted lay opinion that a blood-stained discharge in a cow a few days after service is evidence that she will not "stand" to this service?*

Why is it that sometimes the discharge following oestrus is blood-stained and in other cases not?

A.—It is commonly held by the mis-informed that the slight bleeding from the cow, about 48 to 72 hours after oestrus, is comparable to menstruation of women. Hence the belief that if this occurs, pregnancy does not supervene.

This conclusion is based on an entirely false premise. There is a slight capillary caruncular haemorrhage in the cow at the time of oestrus, and frequently this is sufficient to stain the natural discharges which appear a day or so later, and which are probably the remnants of the mucous secretion of oestrus. At other times (presumably) the haemorrhage is so slight that the blood is resorbed. These phenomena are in no way comparable with menstruation in women. As implantation occurs several days after oestrus, there is no reason to suppose that fertilization would have any effect on the immediate post-oestral discharges.

It should be noted that there may be vaginal or vulval haemorrhage as a result of injury at copulation.

The writer considers that the belief expressed in the question is fallacious.

For a fuller discussion see Williams' "Veterinary Obstetrics," Chap. III, and answer and correspondence, ref.: question CLXIV, in recent issues of *The Veterinary Record*.

. . . . . .

Bracken Poisoning

Q. CLXXVI.—*What are the conditions of weather, plant, and animal necessary for the onset of "bracken poisoning"?*

A.—Most of the reported outbreaks of bracken poisoning have dealt with the condition in cattle, but horses are also said to be susceptible. The toxicity of the plant has been much discussed. Certain experiments have indicated that very large quantities can be ingested without producing any ill-effect, and although deaths have occasionally occurred in feeding trials the condition produced has not been identical with the field disease. At least some of these fatal cases may have been due to the tannic acid contained in bracken producing an altogether different condition from that found in the field disease.

The suggestion has been made that bracken may be poisonous only at certain stages of its growth. In the young state it contains hydrocyanic acid and although occasional deaths have occurred amongst cattle grazing bracken there is no evidence that it is especially poisonous when young. Most of the outbreaks of bracken poisoning have occurred in the late summer and early autumn, but this may be due to the fact that the plant is more readily ingested at this time of the year. It was first recorded in a year of drought (1893).

In view of the many failures to reproduce bracken poisoning, some observers are inclined to the view that the condition is confused with acute bacterial infections. The sudden onset of the disease, accompanied as it is by elevation of temperature, and the nature of the lesions, are arguments that this may be so; but the fact that it is difficult to reproduce artificially with bracken, does not mean that under certain conditions the plant may not be harmful.

. . . . . .

Treatment of Haematuria

Q. CLXXVII.—*What treatment is recommended for the cure or relief of haematuria which occurs frequently in cows in certain areas of this district (Brecknockshire). The condition usually commences during the last two months of pregnancy and may disappear spontaneously after parturition if it be the first attack, but sometimes does not start until just after calving. Subsequent attacks are nearly always fatal, the cause of death being anaemia and cachexia. Post-mortem examinations show only small numerous papilliform areas on the bladder mucosa, from which the haemorrhage occurs. The kidneys appear normal.*

As the disease is a source of considerable economic loss suggestions as to its aetiology and prophylaxis would also be appreciated.

A.—From the facts as far as they are stated there is constantly in the mind of the reader of this question doubt as to whether the cows concerned were passing blood in the urine (haematuria) or merely blood pigment (haemoglobinuria).

A good deal of the doubt is due to the fact that the well-known condition of dairy cows variously named parturient haemoglobinuria, parturient haemoglobinaemia, puerperal haemoglobinaemia, occurring shortly after calving in the winter months in Scotland, Northern Europe and the U.S.A., is associated with a breakdown of red blood corpuscles, the liberated haemoglobin being excreted by the kidneys in an amorphous state which colours the urine. There should be consulted a paper by Wallace[1] where an excellent description is given of this condition as seen in the N.E. of Scotland. Though haemoglobinuria has only been described as occurring in the post-parturient state, there seems to be no reason why the same factors should not precipitate a similar condition prior to parturition. Microscopic examination of the fresh sample of urine, to determine whether the colouration is due to whole red blood corpuscles or merely amorphous products of haemoglobin breakdown, should be done to settle this point.

If amorphous material be found, contact should be made with a biochemist with a view to enlisting his help in the chemical examination of the blood of affected animals.

It has been shown that in parturient haemoglobinuria there is a lowered blood plasma phosphorus, and it is possible that in these days of difficulty in obtaining concentrates or cereals the cows in question may not have been receiving sufficient phosphates, and a relative aphosphorosis may be occurring. Madsen & Nielsen [2, 3] claim to have produced haemoglobinuria in one experimental cow by feeding on beet pulp and alfalfa hay—a diet definitely deficient in phosphorus—and after the appearance of bloody urine to have cured up the condition by drenching with bone meal. The plasma phosphorus of this cow rose from 1·43 mg. to 3·00 mg. per 100 c.c. after drenching with 200 grammes of bone meal within five and a-half hours and on the second and third day the cow was given 100 grammes bone meal twice a day. The beet pulp was replaced by a grain mixture, and the cow placed on pasture. This line of treatment has given good results under field conditions in Utah, U.S.A. Instead of bone meal sodium phosphate might be used.

In view of the lesions seen in the bladder on *post-mortem* examination, particularly if the examination of the urine should show whole red blood corpuscles, it is suggested that if the time of year precludes turning the cows out to pasture or feeding some green crop, a supplement of cod-liver oil be given for the benefit of its vitamin A content. Vitamin A plays an important part in maintaining the integrity of surface mucous membranes, and incidentally, increases urine output when a diet previously lacking in phosphorus has been improved.

Much more might be said, but until the examinations suggested have been made no useful purpose is likely to be served by speculating about other likely causes.

References

1 Wallace, W. R. (1926.) Parturient Haemoglobinuria. *Vet. Rec.* N.S. 6. 1035-38.

2 Madsen, D. E., & Nielsen, H. M. (1939.) Parturient Haemoglobinemia of Dairy Cows. *J. Amer. vet. med. Ass.* 94. N.S. 47. 577-586.

3 ———. (1944.) Production of Parturient Haemoglobinemia by Low Phosphorus Intake. *Ibid.* 105. 22-25.

New Appointments to the Staff of the Ministry of Agriculture

As notified in recent issues, Council, N.V.M.A., has decided that no advertisements for appointments to the veterinary staff of the Animal Health Division of the Ministry of Agriculture shall be accepted for *The Veterinary Record* pending the settlement, in a manner satisfactory to the Association, of the question of the status and salaries of the Veterinary Officers of the Division.

In the meantime, any members of the profession who may, nevertheless, contemplate applying for such posts, should these be advertised elsewhere, are requested first to communicate with the General Secretary of the Association at 36, Gordon Square, London, W.C.1.

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Lancashire Division Dinner-Dance

The Lancashire Division staged a most enjoyable function at the Adelphi Hotel on Friday, November 29th, when Professor J. G. Wright and Mrs. Wright, accompanied by the Lord Mayor and Lady Mayoress of Liverpool, welcomed about 120 members and guests. The latter included Professor Davie, Dean of the Faculty of Medicine, Sir John Barlow, Bart., Member of Parliament for Eddisbury; Howard Dawes, Esq., President of the Royal College of Veterinary Surgeons, and Mrs. Dawes; Professor W. M. Mitchell, President of the National Veterinary Medical Association, and Mrs. Mitchell; Stanley Dumbell, Esq., the Registrar of the Liverpool University; W. G. R. Oates, Esq., the Registrar of the Royal College of Veterinary Surgeons; J. A. Duncan, Esq., the Chairman of the Cheshire Branch of the National Farmers' Union, and J. T. Bibby, Esq., through whose beneficence the Leahurst Field Station became available to the Liverpool Veterinary School.

The toast of 'The Lancashire Veterinary Association' was proposed by Sir John Barlow, and replied to by the President—Professor J. G. Wright. The toast of 'The City of Liverpool' was proposed by Dr. J. R. M. Innes, and replied to by the Lord Mayor of Liverpool—Alderman W. G. Gregson. The toast of 'Our Guests' was proposed by E. R. Callender, Esq., and replied to by S. Dumbell, Esq., and J. A. Duncan, Esq.

It would be invidious to pick out for special mention any of the excellent speeches. It was gratifying to receive confirmation from the principal guests, whether in the civic, academic or agricultural spheres, of the high esteem in which the Veterinary School and the profession are held, and it was made quite clear that the Leahurst Veterinary Field Station at Neston was a great acquisition from every point of view. The laudatory remarks must have been heartening indeed to Professor Wright and his colleagues.

A most enjoyable dance followed the very good dinner, and a happy evening terminated at 1 a.m. Many were heard to express the hope that this would become an annual event with the Lancashire Veterinary Association.

By courtesy of Associated Photo Services, Liverpool

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, December, 1946

LIST OF SUCCESSFUL CANDIDATES

Dublin (*Concluded*)

FIRST YEAR:

Barnes, Michael	Gilmore, D. J.
Casey, J. J.	Horan, Henry (H)
Lyne, J. K.	Keenan, N. T.
Lawther, S. McK.	Keenan, O. M.
McBride, J. J.	Leavy, J. J.
O'Connor, F. M.	Murphy, J. J.
Taaffe, G. F.	O'Brien, M. G.

SECOND YEAR:

Beatty, Miss O. M.	O'Riordan, Miss M.
Cahill, Patrick	Pentland, W. H.
Connors, M.	Rosney, P. C.
Geraghty, M. P.	Slevin, J. G.
	Thornton, I. M. A. (H)

(H) denotes Credit in Histology.

THIRD YEAR:

Carroll, W. M.	O'Connor, J. M.
Devlin, O. K.	O'Nuallain, T. (H)
Hannon, P. J.	O'Reilly, G. M. B.
Kavanagh, Desmond (A)	Polden, A. E.
Layng, J. E.	Treacy, J. T. M.
Murphy, M.	Walker, D. A. (H)
Ni Mhadileoin, Miss S.	

(A) denotes Credit in Anatomy.
(H) denotes Credit in Hygiene.

FOURTH YEAR:

Adams, E. K.	Maguire, C. G. (P)
Beattie, F. W.	O'Neill, J. B.
Boyd, N. C.	O'Rourke, J. J.
Connor, P. J.	Quealy, Andrew
Farrell, Joseph	Richards, R. D.
Ferguson, Miss M. D. R.	Roe, P. F.
Hickey, T. F.	Ryan, P. J.
Higgins, J. P.	Shiel, J. C.
McAufield, R. J.	Skuse, H. G. (P)
McCarthy, James	Tubridy, M. S.
McCaughey, R. M.	White, Declan

(P) denotes Credit in Parasitology.

FINAL YEAR:

Byrne, J. J.	O'Dee, M. J.
Coe, Thomas	O'Leary, Henry
Dodd, Luke	O'Sullivan, E.
Flanagan, Michael	Quinn, P. G.
Henigan, M. J. (S)	Shearman, F. E.
Lynch, Richard	Sweeney, P. J. A.
McKinstry, Miss E. P. B.	Twomey, Michael
Maybin, Richard (S)	Wiltshire, F. H. (M)
Moorhead, P. J.	Wolahan, J. J.

(S) denotes Credit in Surgery.
(M) denotes Credit in Medicine.

NOTES AND NEWS

Diary of Events

Jan. 8th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 2.30 p.m.

Jan. 9th.—N.V.M.A. Committee Meetings at 36, Gordon Square, W.C.1: General Purposes and Finance (morning), Veterinary State Medicine (afternoon).

Jan. 10th.—N.V.M.A. Technical Development Committee at 10 a.m., Council Meeting at 11 a.m. (Both at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2)

Jan. 10th.—Meeting of the Association of Veterinary Teachers and Research Workers (Founder Members resident in Southern Region), at the Royal Veterinary College, N.W.1, 2.15 p.m.

Jan. 15th and 16th—R.C.V.S. Committee Meetings.

Jan. 17th.—R.C.V.S. Quarterly Meeting of Council.

Jan. 17th.—Meeting of the Sussex Division, N.V.M.A., at Brighton (Old Ship Hotel), 2.30 p.m.

Jan. 17th.—Annual Meeting of the Mid-West Division, N.V.M.A., at Clifton, Bristol (Bright's Café), 2.15 p.m.

July 28th—Aug. 1st.—N.V.M.A. Annual Congress in Edinburgh.

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PERSONAL

THE NEW YEAR HONOURS

In the above list, issued on Wednesday last, announcement is made, in the Burma Office section, of the award of the O.B.E. to Mr. G. Pfaff, Research Officer and Principal, Veterinary College, Insein.

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COLONIAL VETERINARY SERVICE PROMOTIONS AND APPOINTMENTS

The Colonial Office announces the following promotions in the Colonial Veterinary Service: Mr. E. Beaumont, M.R.C.V.S., D.V.S.M., Senior Veterinary Officer, Kenya, to be Director of Veterinary Services, Kenya, and Mr. H. Cronley, M.R.C.V.S., D.V.S.M., D.T.V.M., (EDIN.), Veterinary Officer, Uganda, to be Deputy Director of Veterinary Services, Uganda.

The following appointments in the Service also are announced: Flight-Lieutenant B. Bagenal, M.R.C.V.S., as Veterinary Officer, Kenya, and Mr. L. F. Robertson, M.R.C.V.S., as Senior Veterinary Officer, Palestine.

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Births.—HOLT.—On December 27th, 1946, to Elizabeth and Frank Holt, Totnes, a daughter—Cynthia Frances.

PARSONS.—On December 27th, 1946, at Trowbridge, Wilts. to Aileen, wife of John H. Parsons, M.R.C.V.S., a daughter.

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Forthcoming Marriage.—ARCHER—OSGODBY.—The engagement is announced between Dennis Archer, M.R.C.V.S., N.D.A., youngest son of Mr. and Mrs. J. C. Archer, Newlands Farm, Rolleston-on-Dove, Burton-on-Trent, Staffs., and Mary, twin daughter of Mr. and Mrs. R. Osgodby, Peasholm Drive, Scarborough.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Dorset.—Pipsford Farm, Beaminster, Dorset (Dec. 25th); Horsecastle Farm, Sherborne, Dorset (Dec. 26th); Silverlake Farm, Sherborne, Dorset (Dec. 27th).

Somersetshire.—The Middle Farm, Rimpton, Yeovil, Somerset (Dec. 21st); Parsonage Farm, Sutton Montis, Sparkford, Somerset (Dec. 22nd); Woolston Manor Farm, Woolston, Somerset (Dec. 24th).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

VETERINARY AID FOR WORKING SHEEP-DOGS

Sir,—The National Canine Defence League has decided to extend its free Veterinary Aid scheme (in successful operation for over 25 years) for the express benefit of working sheep-dogs belonging to shepherds.

During recent association with shepherds in connection with the League's efforts to obtain better and more food for working sheep-dogs, we have found that many of these indispensable dogs would benefit from a visit to, or from, a veterinary surgeon, but that the cost of this is often an obstacle (sometimes mythical). The habit of consulting a veterinary surgeon in the early stages appears to us to need fostering and the extension of the Veterinary Aid scheme will probably save these valued dogs much severe suffering, judging by the cordial co-operation our original scheme has received from the profession in the past.

One shepherd, writing from Wales, informs us that if his dog could be freed from worms it would be one of the best sheep-dog trial dogs in the country. He has tried several of the advertised "cures" but in his remote fastness has evidently not thought of securing qualified treatment. There are probably hundreds of working dogs suffering from worms and other complaints which could be rapidly cured if veterinary aid were sought. The Ticket scheme is a simple one: CANINE DEFENCE issues a ticket, the dog is attended by the veterinary surgeon who sends the ticket and his bill to the League. Generally the League limits the cost for each dog to £2, but where prolonged treatment is essential we are ready to agree if this is arranged for between the veterinary surgeon and ourselves.

At present the scheme does not cover anyone receiving a direct subsidy (such as hill-farmers) but we will consider any suggestion from members of the profession for further extension of the idea.

We feel that the shepherds and their working dogs should have priority, for they are by no means over-compensated for their arduous tasks and we are confident that many veterinary surgeons will look upon the scheme in the same light.

Yours faithfully,

National Canine Defence League, R. H. JOHNS (*Secretary*).
8, Clifford Street, London, W.1.
December 9th, 1946.